

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE
HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES



In re the Application of: Yoshiharo OHTA et al.

Application No.: 10/594,635

Examiner: Abu Ali Shuangyi

Filed: September 28, 2006

Docket No.: 2691-000050/US

SEMICONDUCTOR POLISHING COMPOUND

BRIEF ON APPEAL

Appeal from Group 1793

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I. REAL PARTY IN INTEREST

The real party in interest for this appeal and the present application is NITTA HAAS INCORPORATED, by way of an Assignment recorded in the U.S. Patent and Trademark Office at Reel 018399, Frame 0439.

II. STATEMENT OF RELATED APPEALS AND INTERFERENCES

Co-pending application U.S. 10/594,475 is currently on appeal. There are no other prior or pending appeals, interferences, or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending Appeal.

III. STATUS OF CLAIMS

Claims 1-12 are pending.

Claims 1-12 stand rejected.

Claims 1-3 and 6 are on appeal.

IV. STATUS OF AMENDMENTS

An Advisory Action was issued on January 20, 2010 notifying Applicants that the traversal arguments submitted in the Request for Reconsideration filed on December 29, 2009, failed to place the Application in condition for allowance. The Request for Reconsideration was submitted in response to the final rejection of the claims in an Office Action mailed on August 10, 2009. This Appeal Brief is submitted in response to the final rejection issued on August 10, 2009.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The subject matter of the present application relates to a semiconductor polishing composition that is an aqueous dispersion solution of fumed silica that can efficiently polish a semiconductor device, such as a wafer, at a high polishing speed without causing a polishing flaw (page 6, lines 5-9). Polishing compositions using colloidal silica and fumed silica as abrasive agents are known. Polishing compositions using colloidal silica require a long polishing time. Polishing compositions using fumed silica provide faster polishing times than colloidal silica but the particles tend to agglomerate which enlarges the particles and can induce polishing flaws (page 2, line 11-page 4, line 1). In an embodiment of the subject matter of the present application, a semiconductor polishing composition has increased dispersion characteristics which controls agglomeration of particles over time. Therefore, the claimed polishing composition may be used at higher polishing speeds and will not cause scratches in a polished semiconductor device (page 28, line 22-page 29, line 21).

Independent **claim 1** describes, a semiconductor polishing composition (page 8, lines 6-11) comprising:

fumed silica, the semiconductor polishing composition being an aqueous dispersion solution of fumed silica (page 16, line 2-page 20, line 14),

wherein an increase rate of average particle diameter of fumed silica after a shake test for 10 days is 10% or less (page 25, line 5-page 26, line 3; Fig. 2).

Dependent **claim 2** describes the semiconductor polishing composition of claim 1, wherein a content of the fumed silica is in a range of 10 to 30% by weight based on a total amount of the composition (page 20, lines 2-3).

Dependent **claim 3** describes the semiconductor polishing composition of claim 1, wherein the average particle diameter of the fumed silica is in a range of 70 to 110 nm (page 9, lines 11-17).

Dependent **claim 6** describes the semiconductor polishing composition of claim 2, wherein the average particle diameter of the fumed silica is in a range of 70 to 110 nm (page 9, lines 11-17).

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for review:

Appellants seek the Board's review of the rejection of claims 1 and 2 under 35 U.S.C. §103(a) as being unpatentable over JP 2003-268354 to Fukuda; and the rejection of claims 3 and 6 under 35 U.S.C. §103(a) as being unpatentable over JP 2003-268354 to Fukuda in view of U.S. Patent 7,211,122 to Iwasa.

Appellants note that the actual grounds of rejection are set forth in the Office Action mailed January 30, 2009.

VII. ARGUMENTS

Appellants request the Board reverse the Examiner's rejection of claims 1 and 2 under 35 U.S.C. §103(a) as being unpatentable over JP 2003-268354 to Fukuda; and the rejection of claims 3 and 6 under 35 U.S.C. §103(a) as being unpatentable over JP 2003-268354 to Fukuda in view of U.S. Patent 7,211,122 to Iwasa.

In support of the request, the following arguments are submitted.

Principals of Law

Under 35 U.S.C. §103(a) a patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made (35 U.S.C. §103(a)).

The Examiner bears the initial burden of presenting a *prima facie* case of obviousness in rejecting claims under 35 U.S.C. §103. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). In rejecting claims under 35 U.S.C. §103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *In re Fine*, 837 F.2d 1071, 1073, 5 USPQ2d 1956, 1958 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), viz., (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art. "[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting

a *prima facie* case of unpatentability.” *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). Furthermore, ““there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness’...[H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the would employ.” *KSR Int’l Co. v. Telefax Inc.*, 127 S.Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)). However, “[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See Oetiker*, 977 F. 2d at 1445, 24 USPQ2d at 1444.

Analysis

A. Claim 1 Is Not Rendered Obvious By Fukuda

Claim 1 recites, [A] semiconductor polishing composition comprising fumed silica, the semiconductor polishing composition being an aqueous dispersion solution of fumed silica, wherein an increase rate of average particle diameter of fumed silica after a shake test for 10 days is 10% or less.

a. Analysis of Fukuda

According to the machine generated English language translation of Fukuda provided by the Examiner, Fukuda relates to a method of manufacturing a fumed silica aqueous dispersion

liquid which can be used as a polishing slurry during the manufacture of semiconductor devices (paragraph [0001]). The dispersion liquid of Fukuda is described as having a silica concentration of about 1-50% of the weight and a pH of about 8-12 (paragraph [0007]). When the dispersion liquid is subjected to shaking for 240 hours (10 days), a growth rate of median particle diameter is about 50% or less (paragraph [0013]).

a.1 Machine translation of Fukuda

When relying on a foreign language document in support of a rejection, “if the document is in a language other than English and the Examiner seeks to rely on that document, a translation must be obtained so that the record is clear as to the precise facts the Examiner is relying upon in support of the rejection. Because all patentability determinations are fact dependent, obtaining and considering full text documents at the earliest practicable time in the examination process will yield the fullest available facts upon which to determine patentability (MPEP §706.02).

Although a machine generated translation of Fukuda has been provided, the translation does not sufficiently make the record clear as to the precise facts the Examiner is relying upon in support of the rejection. For example, the machine translation does not make clear that Fukuda discloses or suggests, an increase rate of average particle diameter of fumed silica after a shake test for 10 days is 10% or less, as in claim 1.

Drawing 1 of Fukuda is described as showing a “graph of the relation between growth rate of the median size of fumed silica aqueous dispersion liquid and shaking time (paragraph [0027]). The graph at Drawing 1, shows the abscissa in increments of hours. However, the units of ordinate of the graph are not translated in the drawing or in the machine translation of the text. Therefore, it is unknown as to what the numbers provided on the ordinate refer. Appellants

respectfully submit that there is no indication on the ordinate or in the text that the numbers refer to a percent increase rate of particle diameter. Accordingly, a fact dependent determination cannot be made using the machine generated translation provided to Appellants.

When properly interpreted, the ordinate of Fukuda indicates a relative value of median particle diameter after the predetermined period of shaking compared to a base line value of the median particle diameter before shaking begins (i.e., a base line value of “1”). Thus, the graph at Drawing 1 of Fukuda shows a base line value of “1” representing the median particle size before shaking begins and the relative growth rate compared to the base value. Accordingly, the graph of Fukuda does not disclose or suggest an increase rate of average particle diameter of fumed silica after a shake test for 10 days is 10% or less as alleged in the Office Action.

a.2 Expectation of Fukuda disclosing claim elements

It is admitted in the Office Action that Fukuda fails to disclose or suggest the claimed rate increase of average particle diameter size. However, independent claim 1 is nonetheless rejected because “it would be expected the fumed silica dispersion mad[e] by a substantial similar process to have the same properties [(t)he increased rate) absent any evidence to the contrary” (see page 3 of the January 30, 2009 Office Action).

Appellants firstly note that there is no citation in rule or law in the Office Action supporting the allegation that a product made by a substantially similar process is understood to render a feature of a product claim *obvious* absent any evidence to the contrary. Rather, during examination, the burden is on the Examiner to show that the claimed subject matter would have been obvious to one of skill in the art at the time the invention was made. As there is no evidence of obviousness, the rejection should be withdrawn.

Moreover, Appellants respectfully submit that the process of Fukuda is not a substantially similar process that would necessarily result in a fumed silica having the same properties as those claimed. For example, in Fukuda, an intermediate aqueous solution of fumed silica is prepared and this solution is added into a basic liquid. In contrast, the process described in the present case includes an acidic fumed silica dispersion being prepared and then diluted by water in order to be added to an alkali aqueous solution. This dilution step keeps a rate of increase of average particle diameter of abrasive grains in slurry low. Thus, the processes are not so substantially similar as to result in a silica dispersion having the same properties as claimed.

Further, based on the Examiner's reasoning that an allegedly similar process would produce the same results, it appears that the Examiner is relying on the principles of inherency to reject the claims. However, under the principles of inherency, the disclosure being relied upon must show that the natural result flowing from the operation of the device would result in the performance being claimed (*Hansgirk v. Kemmer*, 102 F.2d 212, 214, 40 USPQ 665, 667 (CCPA 1939)). Thus, inherency requires that those things will always flow naturally from that which is disclosed in a prior art reference (*Application of Smyth*, 480 F.2d 1376, 1384, 178 USPQ 279, 285 (CCPA 1973)).

Applicants respectfully submit the fumed silica polishing compound being made by the method of Fukuda to have a fumed silica dispersion with a pH of 2-11 and a concentration of fumed silica of 1-50% by weight would not necessarily have an increase rate of average particle diameter of fumed silica after a shake test for 10 days is 10% or less. For example, the graph shown in Drawing 1 of Fukuda, each of the six compositions were created by a "substantially similar" process yet each produces different results at the end of the shake test. Therefore, as

clearly demonstrated in Fukuda, fumed silica dispersions made by similar processes do not have the same properties, including the increased rate.

Moreover, it is at best unclear by what is meant as a “substantially similar” process. For example, in Fukuda, an intermediate aqueous dispersion solution of fumed silica is prepared and the solution is then added into a basic liquid. In contrast, in the process of making the claimed semiconductor polishing composition, an acidic fumed silica dispersion solution is prepared and then diluted by water in order to be added to an alkali aqueous solution. This dilution is clearly described as a “dilution step” in the specification and serves to keep an increase rate of average particle diameter of abrasive grains in the resulting slurry low. In other words, the process of Fukuda is not substantially similar to the claimed process and therefore, there would be no expectation that the two processes would produce substantially similar results.

The dissimilarities of the polishing compositions resulting from the processes is illustrated in the Graph of Drawing 1 in Fukuda and Fig. 2 of the present application. In Fig. 2, a silica concentration of 25% is shown in Examples 1 and 2 as symbols ♦ and ◇ having an increase in growth rate of 1%-2%. In contrast the graph of Fukuda shows a silica concentration of 25% as “•” which has a growth rate of about 400% (over 4x the base value of 1). Thus, the allegation that the processes are substantially similar is incorrect.

a.3 Disclosed range of Fukuda

Fukuda also discloses a growth rate of median particles of about 50% or less (see paragraph [0013]). However, a prior art reference that does not disclose a specific embodiment in the claimed range does not correspond to the claimed range (see *Atofina v. Great Lakes Chemical Corp.*, 441 F.3d 991 (Fed. Cir. 2006)). Moreover, “the disclosure of a genus in the

prior art is not necessarily a disclosure of every species that is a member of that genus” (Id 441 F.3d at 999). Finally, if the reference teaches a broad range...it may be reasonable to conclude the narrower claimed range is not disclosed with sufficient specificity to provide a basis to reject the claims (MPEP §2131.03(II)).

In the instant case, there is no specific embodiment in Fukuda of “an increase rate of average particle diameter of fumed silica after a shake test for 10 days is 10% or less.” There is also no specificity of a range other than the broad range of “about 50% or less.” Thus, there is not sufficient specificity in Fukuda to render the claimed range obvious.

Also, if a reference’s disclosed range is so broad as to encompass a very large number of possible distinct compositions, a situation analogous to an obviousness of species when the prior art broadly discloses a genus may be presented (*In re Harris*, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005); *In re Baird*, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); *In re Jones*, 958 F.2d USPQ2d 1941 (Fed. Cir. 1992); MPEP §§2144.08, 2144.05).

In the present case the range disclosed by Fukuda of about 50% or less is so broad as to encompass many distinct compositions such that the range does not render the claimed range obvious.

Moreover, the claimed range is not obvious in light of the broad range disclosed in Fukuda due to the criticality of the claimed range recognized and described in the present application. As discussed throughout the specification of the present application, due to the elements and characteristics of the claimed semiconductor polishing compound, agglomeration of fumed silica particles is reduced and therefore reduces and/or prevents polishing flaws in a semiconductor device (see for example paragraphs [0081]-[0093]; Figs 2 and 3, demonstrating

the criticality of the claimed range). Because the range of Fukuda is 5x greater than the claimed range, the range of Fukuda does not render the claims obvious.

B. Claim 2 Is Not Rendered Obvious By Fukuda.

Claim 2 recites “[T]he semiconductor polishing composition of claim 1, wherein a content of the fumed silica is in a range of 10 to 30% by weight based on a total amount of the composition.”

In rejecting claim 2, it is alleged that the Abstract of Fukuda teaches a fumed silica dispersion having a concentration of 1-50%. As discussed above, “the disclosure of a genus in the prior art is not necessarily a disclosure of every species that is a member of that genus” (*Atofina v. Great Lakes Chemical Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006)). Further, if the reference teaches a broad range...it may be reasonable to conclude the narrower claimed range is not disclosed with sufficient specificity to provide a basis to reject the claims (MPEP §2131.03(II)).

In the instant case, there is no specific embodiment in Fukuda of a content of fumed silica in a range of 10-30% by weight based on the total amount of the composition that has an increase rate of average particle diameter of fumed silica after a shake test for 10 days is 10% or less. Thus, there is not sufficient specificity in Fukuda to render the claimed range obvious.

Because Fukuda fails to disclose or suggest the claimed range of concentration of fumed silica, the reference fails to render the rejected claim obvious. As such withdrawal of the rejection and allowance of claim 2 is requested.

C. Claims 3 and 6 Are Not Rendered Obvious By Fukuda and Iwasa.

Claims 3 and 6 recite “wherein the average particle diameter of the fumed silica is in a range of 70 to 110 nm.”

It is admitted in the Office Action that Fukuda fails to disclose or suggest the subject matter of claims 3 and 6. However, it is alleged that Iwasa discloses the claimed feature and that one of skill in the art would have modified Fukuda to include the average particle size of Iwasa.

However, there is nothing in the references¹ that would indicate that the fumed silica having an average particle size as disclosed in Iwasa would have an increase rate of average particle size of 10% after shaking for 10 days, as claimed. Simply alleging the use of the fumed silica particles of Iwasa provides no indication that such a particle would exhibit the claimed rate increase. Thus, there is no expectation of success in making modifying Fukuda as suggested. Further, because Fukuda is silent regarding average particle diameter, altering the fumed silica dispersion of Fukuda as suggested may render the dispersion unfit for its intended use.

Also, in making an assessment of the differences between the prior art and the claimed subject matter, 35 USC §103 specifically requires consideration of the claimed invention “as a whole.” The “as a whole” instruction in §103 prevents evaluation of the invention on a part-by-part basis. Without this important requirement, an obviousness assessment might break an invention into its component parts, then find a prior art reference corresponding to each component. This line of reasoning would import hindsight into the obviousness determination by using the invention as a roadmap to find its prior art components (*Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1275, (Fed. Cir. 2004)). “Further, decomposing an invention into its constituent

¹ The teaching or suggestion to make the combination, and the reasonable expectation of success, must both be found in the prior art and not based on the Applicant’s disclosure (MPEP § 2143).

elements, finding each element in the prior art, and then claiming that it is easy to reassemble these elements into the invention, is a forbidden ex-post analysis.” (*In re Mahurker*, 831 Fed. Supp. 1801, 28 USPQ 2nd 1801). This rule of patent examination is reinforced in *KSR Int’l Co. v. Teleflex Inc.*, in which the court stated that, “[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

In other words merely locating a fumed silica particle having a diameter similar to that claimed does not, without more, render the claim obvious. Therefore, withdrawal of the rejection is respectfully requested.

VIII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejections are in error and that all rejected claims are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejection of the pending claims and direct that the application be allowed.

Respectfully submitted,

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APPENDIX A – CLAIMS APPENDIX

1. A semiconductor polishing composition comprising:
fumed silica, the semiconductor polishing composition being an aqueous dispersion solution of fumed silica,
wherein an increase rate of average particle diameter of fumed silica after a shake test for 10 days is 10% or less.
2. The semiconductor polishing composition of claim 1, wherein a content of the fumed silica is in a range of 10 to 30% by weight based on a total amount of the composition.
3. The semiconductor polishing composition of claim 1, wherein the average particle diameter of the fumed silica is in a range of 70 to 110 nm.
4. The semiconductor polishing composition of claim 1, wherein the semiconductor polishing composition is prepared by adding an acidic fumed silica dispersion solution to an alkali aqueous solution.
5. The semiconductor polishing composition of claim 4, wherein a pH of the alkali aqueous solution is in a range of 12 to 14.
6. The semiconductor polishing composition of claim 2, wherein the average particle diameter of the fumed silica is in a range of 70 to 110 nm.

7. The semiconductor polishing composition of claim 2, wherein the semiconductor polishing composition is prepared by adding an acidic fumed silica dispersion solution to an alkali aqueous solution.

8. The semiconductor polishing composition of claim 3, wherein the semiconductor polishing composition is prepared by adding an acidic fumed silica dispersion solution to an alkali aqueous solution.

9. The semiconductor polishing composition of claim 6, wherein the semiconductor polishing composition is prepared by adding an acidic fumed silica dispersion solution to an alkali aqueous solution.

10. The semiconductor polishing composition of claim 7, wherein a pH of the alkali aqueous solution is in a range of 12 to 14.

11. The semiconductor polishing composition of claim 8, wherein a pH of the alkali aqueous solution is in a range of 12 to 14.

12. The semiconductor polishing composition of claim 9, wherein a pH of the alkali aqueous solution is in a range of 12 to 14.

APPENDIX B – EVIDENCE APPENDIX

None

APPENDIX C – RELATED PROCEEDINGS APPENDIX

A Notice of Appeal was filed in co-pending U.S. Patent Application U.S. 10/594,475 on February 19, 2010 appealing the final rejection of the claims in an Office Action mailed on January 27, 2010. No Decision has been rendered in the proceeding.